

PSYCHOLOGICAL ASPECTS OF THE
SAFETY OF FIRE FIGHTERS

Psychological Aspects of the Safety of Fire fighters

INTRODUCTION

Since the Fire Task Force Study in 1957 particular emphasis has been placed on safety of fire personnel. Development and use of the Standard Fire Fighting Orders, fire behavior training courses, fire training film program, wide-spread distribution of accident reviews and experimentation with protective clothing are examples of increased attention to personnel safety. Despite these efforts, the Forest Service continues to have many serious accidents. This led to the conclusion that it might prove helpful to get the viewpoints and analysis of someone outside of the Forest Service unfamiliar with our programs. To accomplish this, Dr. Terrence M. Allen, professor of psychology at Michigan State University was employed. The late Arthur Jensen of the W.O. Division of Fire Control was assigned to work as technical advisor to Dr. Allen. The project Plan and Dr. Allen's report "Psychological Aspects of the Safety of Fire-Fighters" are attached.

PROJECT PLAN

Basic Reaction Study

A study of Human Reactions under
Fire Emergency Situations.

Objectives:

1. To determine what motivates individuals in fire suppression forces to react as they do in a variety of fire emergency situations, too many times resulting in the tragedy of injuries and deaths.
2. To report findings and make recommendations for making fire control work safer.

Who?

Team to be composed of --

- a. Arthur W. Jensen - Forester, Washington Office
- b. Visit Region 6 during week of July 25.
- c. Visit Region 5 starting week of August 1, for balance of trip.
- d. This itinerary will be flexible to permit visiting going fires.
- e. Final report to be prepared and submitted to Fire Control (Washington Office) by October 1. Forest Service to furnish secretarial help.

Operating Procedures:

- a. Review Regions' general fire programs, including particularly selection of personnel, fire organization, instructions, policies, procedures, and morale.
- b. Analyze type of people we use on fires --

b. Analyze type of people we use on fires --

1. Physical condition) What tests do we have - are they
) adequate?
2. Mentality level
3. Educational background
4. General background
5. Language comprehension
6. I. Q.
7. Ability to understand and carry out instructions
8. Fire fighting normal or intermittent occupation
9. Experience on fires
10. Reasons for being a fire fighter

c. Analyze effectiveness of training program to know the job and to use safe practices.

d. Look for opportunities for simulated training.

e. Review blow-up case histories involving fatalities, serious injuries, or near-miss situations. Interview persons involved in these situations. Both workers and supervisors.

f. Visit going fires for on-the-ground study of basic reactions of fire suppression forces.

1. Observe human behavior patterns.

2. Relate effectiveness of fire forces to training given.

g. Contact cooperating agencies such as State and local fire organizations, other Government fire organizations, and the military relative to the basic reaction problems. Check into former Camp Ord study.

h. Prepare report, listing findings. Make recommendations.

PSYCHOLOGICAL ASPECTS OF THE SAFETY OF FIRE-FIGHTERS

Terrence M. Allen, Michigan State University

Despite continuing efforts for many years, the safety of fire-fighters remains a problem of concern throughout the Forest Service. Although it is recognized that fire-fighting is intrinsically hazardous, it is felt that further possibilities of reducing the hazard should be explored.

Accordingly, the Division of Fire Control in Washington asked the author, an outsider with little previous contact with the Forest Service, to study the problem for a six-weeks period during the fire season. It was hoped that approaching the problem from a psychological frame of reference would provide some insights that might prove helpful. This report presents the observations made.

The conclusions herein are based on observation of fire-suppression action on project fires, and on interviews with more than one hundred fire-control personnel from the level of laborer to regional chiefs of fire control. Interviews were conducted on the fire line, in the fire camp, in the hospital, and in Forest Service offices. A few persons of other fire control organizations were also interviewed. A total of six days was spent on project fires, with the remaining time spent in interviewing, travel, reading of pertinent written materials, and preparation of the report. The Division of Fire Control provided a forester with considerable fire experience to act as a guide, to make arrangements and contacts, and to help the author interpret what he observed in terms of fire-suppression action and Forest Service procedures. The help of this guide was of inestimable value, and many of the insights in this report should be credited to him.

Judgments based on a brief study are necessarily hazardous. Conclusions could only be made after discussing problems, observations, and conclusions with a number of experienced men who had devoted a great deal of time to consideration of this problem. Excellent cooperation was received; the willingness of these men to give hours of their time in the height of the fire season is much appreciated. A major portion of what is worthwhile in this report must be credited to them. Since it was highly important that men be able to express themselves freely and frankly, anonymity of respondents is maintained in all cases. Such anonymity, which is also extended to specific fires and the observations made there, limits the degree to which specific instances can be cited, and makes unsupported generalizations necessary.

However, the opinions expressed are the author's own, and do not reflect a consensus of the persons interviewed. It was felt that the author's greatest contribution could be made in the role of a critic, concentrating attention on things in need of improvement rather than on things presently well done. With the awareness that many opinions may be in error, they are presented in the hope of stimulating thinking which may lead to improvements in fire-fighting safety.

PRELIMINARY ANALYSIS

The objectives as outlined by the Forest Service were, first "to determine what motivates individuals in fire suppression forces to react as they do in a variety of fire emergency situations, too many times resulting in the tragedy of injuries and deaths"; and secondly "to report findings and make recommendations for making fire control work safer."

For a short study, it is necessary to decide what aspects of the problem to direct attention toward. For this purpose, three aspects of the problem were examined: (a) actions previous to the emergency which led to the situation being as it was at the time the emergency occurred; (b) behavior during the emergency; and (c) consequences of the behavior.

Actions Preceding Emergency Situations. It appeared that in most tragedy and near-miss incidents, actions which preceded the incident were of great importance. In fact, one of the questions which presented itself most clearly was, why is it that things which should be done are not done -- things which repeated incidents have shown to be critical in contributing to tragedy situations, and yet which often are not done on the fireline. Since these things are in large part related to training, to organization and supervision, and to anticipation of fire behavior, these factors deserved special consideration. Since prevailing attitudes on the fire line and fatigue of overhead seemed related to this problem, these factors also received attention.

Behavior During Emergencies. Given a situation potentially hazardous, the next phase was to consider the behavior of men during the emergency itself. To what degree is panic a factor, and what are the major factors affecting panic? It appeared that panic does not result except in the case of inadequate leadership; even inexperienced workers in a very dangerous situation do not panic given adequate leadership. However, if the leader does not have sufficient control of his men, if they do not have confidence in his judgment, or if he fails to initiate clear and decisive group action, it is quite possible for men to panic completely and run like rabbits.

Since the natural reactions of inexperienced men in the face of fire are usually in conflict with the safest action, leadership is of even greater importance. Since there is a strong relation between adequate leadership in work preceding the emergency and adequate leadership in the emergency situation itself, and since there was no sharp delineation between the characteristics of adequate leadership, deserved major attention.

Since persons differ in the adequacy of their responses in emergencies, attention was directed to the quality of personnel used on fires. Because analytical thinking when in danger of death is very difficult, simple instructions regarding what to do if an emergency arises are likely to be followed even if the leader is not present. For the same reason, the need for the leader to think things out before the emergency is upon him is important. The possibility of training improving the adequacy of behavior during emergencies seemed worth examining.

Consequences of Behavior. It is obvious that unsafe behavior before or during an emergency can lead to tragedy. It may not be quite so obvious that it usually does not. As with all types of accidents, most unsafe practices only seldom lead to serious consequences - usually luck or last-minute action avoid such consequences. Men learn that unsafe procedures usually work out alright, and don't expect the unlucky time when they don't to happen to them. It is the function of a safety program to counter this natural tendency of men, to achieve adequate behavior in preparation for an emergency which the men may never have experienced, and which probably will not occur. Accordingly, an examination of the whole program regarding safety from fire seemed indicated.

In this report, brief attention is given first to personnel. Then, the interrelated topics, organization, leadership, attitudes, and fatigue are discussed under the topic "organizational atmosphere." Discussion of training (with special attention to fire behavior training) is followed by observations regarding the safety program. Finally, tentative recommendations are submitted.

PERSONNEL

Study of the type of persons involved in reported emergencies revealed no obvious patterns -- almost all types of personnel employed on fires have been involved. Although some obvious generalizations could be made, such as inadequate training and experience produce inadequate responses in emergencies, this approach did not seem promising. Since easily-administered personality tests have found little success in predicting behavior in stress situations, they seem to hold little promise for selection of fire control personnel. The extensive individual psychological assessment necessary for such predictions would be prohibitively expensive for lower-level personnel, and for higher-level personnel predictions based on previous behavior are usually available.

Contact with professional-level Forest Service personnel left one very strong impression -- the loyalty and dedication to duty of these men is unusual. It appears that the salaries and prestige of the Forest Service are adequate to attract competent and dedicated men. Although some observations are made below concerning the assignments of men in fire-suppression work, selection and placement did not provide a focus for study of fire fighting safety. A cursory look at seasonal personnel did not leave as favorable impression. The rewards possible for such personnel, including salary, working conditions, and job satisfaction, do not appear so favorable. Turnover seems high, and selection procedures in some cases appeared to regard laborers as "bodies". Although attention might well be given to means for making subprofessional positions more attractive, and for developing a more thorough selection procedure including specially-constructed tests, the relevance of such efforts to safety is limited.

ORGANIZATIONAL ATMOSPHERE

An aspect which struck the author upon observation of the first fire and each other one observed, which seemed particularly related to actions which could lead to emergency situations, will be referred to as organizational atmosphere. Although the degree to which the description below is apt varies from fire to fire, and although it may be slightly overstated for emphasis, discussion with numerous persons has convinced me that the characteristics are not peculiar to any region or particular type of fire. To communicate what is meant by the term organizational climate, it will be necessary to discuss the attitudes of people, the type of leadership, and the functioning of the organization.

Attitudes. The attitudes observed on the fireline did not indicate the type of morale characteristic of an effectively functioning organization. Although with a large fire a sense of urgency is felt by citizens in the area, and is apparent at the fire headquarters, it seems to be lacking on the fire line. Instead, there is a passive attitude, a "let George do it" feeling. Things undone which should be done do not arouse a sense of urgency which would be appropriate. There seems a lack of initiative -- a spotfire which seems to be no one's particular responsibility may receive no action until responsibility is assigned by higher authority. The ingenuity of which men are capable is not brought out. When assigned tasks are completed, there is a tendency to sit down and wait for further orders in spite of obvious actions which should be taken. It is as if men are mostly waiting -- for orders, for a tractor, or maybe men are not sure what they are waiting for. There is a tendency to assume -- to assume that needed action will be taken by somebody -- to assume that higher organization knows what is going on -- to assume that the fire will stay as it is. There is an attitude of fatalism -- men are ready to give up easily and await further orders, and do not seem surprised

when the fire gets away. These attitudes are characteristic not only of crewmen; they often extend to the level of sector boss or higher.

Leadership. The dynamic personal relationship between a man and his superior which is characteristic of an efficiently functioning organization is missing. There seems to be the attitude that the duty of a boss is to give orders, and the duty of the men to carry them out. The boss gives orders, assumes they will be carried out, and then is not surprised to find they were not carried out properly.

There is a lack of leadership for motivation. As one man put it, "Maybe a man on a white charger leading the troops isn't the answer, but something is needed." Thirty years ago, the "bull-of-the-woods" type of supervisor was effective, in which the boss gave orders and had the power to make the men carry them out. The boss no longer has sufficient power to punish, and most men today won't put up with that type of supervision, so that it has passed out of the picture. Many men have expressed preference for Mexican nationals or Indian crews who will respond to orders in the old way. The common attitude that you can't make an effective crew of loggers, or even of miscellaneous pickups, does not seem justified -- it's just that it takes leadership to make an effective crew of new men. The modern approach in industrial leadership, in which the supervisor leads the men to want to do the job effectively, has not got to the fireline.

Organization. The "organizational atmosphere" may be further described in terms of the function of the organization. In contrast to the aggressive action which seems to characterize initial attack forces, on large fires, there seems to be a general lack of initiative in attacking the fire aggressively. Although aggressive action may be in progress on one sector, there are large numbers of men sitting on their backsides. In spite of the goal of having the fire under control by 10 A.M., too often the same fire gets away day after day in spite of adequate resources. The causes seem to be the same old ones -- not completing burning out; not completing the line in time, not catching spotfires -- and people on the line are fatalistic about it. There appears to be a general toleration of mediocrity. Initiative in carrying out responsibilities does not seem to be expected at lower levels of the overhead. Everyone seems to wait for orders before doing anything.

Another aspect is the "snafu" situations that are continually arising. When a 500-man organization is created in 24 hours, a certain amount of "snafu" is inevitable, but one wonders if this organizational atmosphere does not make for more such situations. It is understandable when a plane makes a drop on a burn-out fire, but when the plane repeats the performance an hour later one wonders. There seems to be a fatalistic attitude toward "snafu", and inadequate official recognition of it as a problem to be dealt with.

One is tempted to generalize that large fire organizations are just overgrown small-fire organizations, without sufficient changes in organizational procedures to provide for the increased size. Although headquarters operations were observed very little, the author suspects that the fireboss often functions much like he would on a smaller fire, constantly issuing orders based on his intuition and personal observation, rather than as an administrator who delegates most immediate concerns and concentrates on planning ahead. With the possible exception of additional men to aid the line boss in preventing and correcting 'snafus', no beneficial changes in organizational structure can be suggested. Improvements in procedures aimed at preventing, detecting, and correcting snafus appears to be possible, particularly since a man may be a sector boss on one fire, safety officer on the next, and camp officer on the next. Although extensive use of checklists would be going too far, more explicit accounting for details important for snafu might be helpful.

However, it seems clear that inadequate communication is a large factor in 'snafu,' particularly inadequate communication upward. The vital importance of adequate communication to safety has been pointed out in previous safety reports, and many men have expressed disappointment over the failure of radios to solve the communication problem. Men at higher levels just don't have a sufficiently accurate picture of what is taking place at lower levels. Emphasis is on objective impersonal clarity of orders downward, without adequate realization that effective communication is a dynamic two-way process. Only through feedback of understanding can clarity of communication be obtained. Only if the men at the bottom have more information on how their operation fits into the overall operation can they intelligently communicate upward. On a small fire with men who have worked under him for some time, a boss can comprehend the total picture from his own observation, and give orders that will be carried out. On a large fire, this approach just doesn't work very well. What is necessary is for each man to have a congruent perception with each subordinate, and with his superior, of the overall picture at their respective levels. More adequate personal communication is needed.

Another important aspect of the organizational atmosphere is inadequate delegation of authority, which explains many of the deficiencies in the leadership and communication functions. Some bosses spend much of their time in what in any other job would be called "putting out fires". They hurry up, give an order, hurry away, hurry back, and find it not being performed as they wanted it. They take over the job from their subordinate, direct it themselves, and hurry away again. Such behavior as a boss with a burnout torch in his hand instead of being back where he can see the overall picture, is illustrative of a general shortcoming -- bosses become so involved in details they should delegate to their subordinates that they fail to see problems developing at the level where their attention should be directed.

This tendency for bosses to function one job level lower than they are assigned is exaggerated when the pressure is on, because a natural reaction to frustration is to regress to behavior which was adequate in a previous situation. Illustrative cases were related to the author in which a fire boss became "the best line boss you ever saw", or a sector boss took over a critical section of line functioning as a crew boss. Such behavior when the fire is hot can endanger lives as well as result in loss of the line. Another symptom of inadequate delegation of authority is the common complaint of crewmen: "Too many bosses!" Jumping across lines of authority downward has a poor effect on subordinate overhead, and on the crewmen receiving the contradictory orders. It certainly does not encourage initiative on the part of either.

Another factor which contributes to this organizational climate is a general lack of fire control professionalism. Except for people in fire jobs, fire-fighting is everyone's second job. Some of these men are not very interested in fire fighting, and are anxious to get back to their regular jobs. Although they recognize the importance of fire control, they regard it as a dirty tiring job with low status, and will avoid going if they can. Mediocre performance is acceptable on the fire, and their performance on the fire will not be important to their advancement in the Forest Service. Men with such attitudes certainly do not make a healthy organizational climate. It would seem that measures designed to raise the status of fire suppression work, and to make worthwhile rewards for effective performance, are indicated.

Affect on Safety. This organizational atmosphere has important affects on safety as well as on operating efficiency. An organization that is functioning effectively is less likely to let a dangerous situation arise, and is better able to respond to one that does arise.

Although a fatalistic attitude toward safety is unthinkable in the Forest Service, the men behave as if they were fatalistic about safety. The things undone which should be done include in many cases the ten standard orders. An excess of green men on a fireline not successfully burned out, without safety zones to go to, is potentially dangerous. If they have not worked or received training, the crew boss cannot possibly have adequate control over them. A green crew of 25 men without effective suborganization cannot be handled effectively in an emergency unless they are kept very close together. Most "snafu" situations that occur in the line organization are potentially hazardous. The dependency of crew bosses on their superiors (which is learned because of inadequate delegation of authority) is not good for safety. Emergencies usually arise too quickly for advice to come from above. The attitudes and leadership described above are not appropriate for adequate response to emergencies. Safety, as an inter-related part of the fire-suppression operation, is affected by the organizational atmosphere.

The poor organizational atmosphere often results in inadequate fire-suppression action, which results in a larger fire. A larger fire increases the number of men exposed to the fire, particularly the number of inexperienced men. It increases the risk of dangerous "snafus", and often falls back on overhead of poorer quality, particularly at crew boss levels. During the first day a fire escapes initial attack, it is likely to burn fairly cleanly with a regular perimeter. On each succeeding day it is likely to have a more irregular perimeter with more islands of unburned fuels and more areas of dried-out canopy. Because of its greater size, the probability is higher that sufficient heat will be generated inside the fireline for the fire to hit a line hard, with danger to the men on it. Such a fire is intrinsically much more dangerous, and the risk of men getting burned is much more serious. From the viewpoint of safety alone, means for increasing the effectiveness of large-fire suppression are important.

Fatigue. It seems reasonable to suppose that fatigue is a contributing factor to the organizational atmosphere. The attitudes referred to have a good deal in common with the attitudes of a tired man. Fatigue is characterized by a distortion of perception to the need for rest and release from tension. It encourages a willingness to assume everything will be all right, and a fatalistic attitude releases one from the tension of worry. Fatigue also contributes to a lack of initiative and a passive attitude.

Although tired laborers were seen on occasion, fatigue of crewmen does not seem to be a problem. Fatigue of overhead, however, does seem to be a problem requiring attention. It is just not possible for a man to function at maximum effectiveness for much more than twelve hours without unusually high motivation. And the physical effort and mental strain of fire overhead is about as extreme as is likely to be found on any job. Research has shown that for a short term need, a man in extreme fatigue can perform mental functions as well as when rested. In an emergency, or for the short time his superior is present, a man's mind can be as clear and sharp as ever. For a task requiring sustained effort, however, performance deteriorates seriously. A man will react quite differently to a job requiring effort, and standards of acceptable performance can change markedly. Men tend to forget things, and tend to persevere -- that is, to continue their mental processes in the same way; to expect the fire to continue as it is, to expect it to do as it did yesterday, etc. -- and ingenuity is less likely to be exhibited. The man with many years of fire experience and a good deal of experience in the job he holds has habit patterns to fall back on, and his "intuition" regarding the correct thing to do is likely to be adequate. The younger man, however, or the man with less experience in the job he holds, must think things out rationally, which is very difficult behavior for a tired man to maintain.

When overhead comes off duty, much additional time is spent in planning and caring for crews, and many men are too tense to rest very well. Prestige attaches to the number of hours without sleep, and a man will not take steps to provide rest for himself. Men often are on the job in a state of fatigue that is extreme. It seems to this outsider that fatigue of overhead is a far more serious problem than most Forest Service people are aware. Measures designed to reduce fatigue of overhead certainly seem indicated.

TRAINING

On the Fire Training. The most striking thing about fire-suppression training is the apparent lack of utilization of on-the-fire training potential. A recurring refrain in the interviews with higher-level personnel was, "The problem is the lack of sufficient overhead with large-fire experience". When the problem is stated this way, the only solution is to have more large fires. The philosophy seems to be that overhead learns by experience with large fires. After a man has been a crew boss for a time, and has received certain classroom training (mostly in theory and standard procedures), he is supposed to have learned how to be a sector boss, in spite of the fact that the two jobs, if performed effectively, are quite different.

It is almost a truism in training, that experience does not necessarily produce learning. Often a man never understands what happened beyond his own immediate area because he doesn't know what to look for, and his superior hasn't given him enough of the overall picture for him to evaluate what he sees and hears about. He is not encouraged to ask questions except concerning what he is expected to do. The man could learn so much more if he had a continual close relationship with a capable and articulate division boss who would work closely with him tying in classroom training with the present situation. When the man had formulated a plan of action, his superior would help him reformulate it into a better plan, and lead him to think like a sector boss.

A slogan in many industrial training programs, "A primary duty of every management person is to train the men under him", is in sharp contrast with both official written materials and behavior on the fires. Training is thought of as one thing and experience as another; the need for integration of the two does not seem to be appreciated. Certainly training is not the primary duty, and overhead cannot devote time to training when the fire is hot. But early in the season, and in relatively quiet periods on large fires, a boss who is not too involved in the details he should be delegating can do a great deal toward helping the men under him to learn to perform their jobs more effectively.

For crewmen as well, opportunities for on-the-fire training are not exploited adequately. Green men are given a certain standard training which may be as little as a few minutes, and little further attention is given. Advantage should be taken of fire inside the line to train pickup crews for putting out spotfires later the same day. Sufficient idle time is usually available to have crews fully trained in mop-up by the time the fire is controlled.

Since the organizational atmosphere that exists cannot be changed merely by organizational changes or changes in the orders downward, training seems to offer the best avenue by which it could be improved. It is important that training opportunities be given serious attention.

Fire-Behavior Training. Since understanding fire behavior is so essential to effective fire-suppression, for fire-behavior training to be connected primarily with safety training certainly seems strange. In reading through the reports and recommendations made from the study of tragedies, one cannot but get the feeling that the emphasis on unusual fire behavior may be a function of a need to attribute blame to something other than failures within the fire-suppression organization.

A brief course in fire-behavior theory, successively watered down at each level of supervision, without follow-up on the fire, does not seem to be achieving the desired results. Even if the theory were well understood, to assume that application of the theory is obvious is one of the most common errors made in training programs.

Given theory they do not really understand, and given little on-the-fire training in fire behavior, overhead learn that blow-ups resulting in tragedies can occur due to causes beyond their ken. Experiencing a blow-up or two which no one adequately explains to them, will reinforce such an attitude toward fire behavior. If this does not produce fear, men's confidence must be based on something other than their own knowledge. They learn: when blow-up possibilities exist, or may exist, prepare to withdraw from the fire. The general feeling of inadequacy regarding fire behavior and safety increases the dependency of a man on his superior, an aspect of the organizational climate which reduces initiative. The man feels a need to check with his boss lest he unwittingly do something unsafe. It would seem that what is desired is for each overhead man, given fireweather predictions (and fire behavior predictions if available), learn to predict in an explicit step-by-step manner the probable fire behavior on his sector during his shift. He should then make his plans accordingly. He should also predict, in the same manner, the worst fire behavior which could be expected on his sector, and have an alternate plan ready to put into action. Such thinking is not easy, and is unlikely to come about without help. The learning that could take place by continual discussion with a good fire man, constantly tying in theory with the present situation and with safe effective suppression action would develop in the man a soundly-based confidence in his judgment and a realistic evaluation of its limitations.

THE FIRE SAFETY PROGRAM

To an outsider, it appears that the present emphasis on safety is out of perspective. It is as if safety were imposed by administrative fiat rather than integrated with the fire-suppression operation. Although the present emphasis is understandable historically, and has probably had considerable beneficial effect, further progress would seem to require a different approach.

It is surprising to find an organization with very few full-time safety people, and almost no professionally-trained safety personnel, so fully safety-conscious. The strong emphasis on fire safety emanating from the central office in Washington has certainly had an effect. However, the emphasis on safety as an end in itself has had some undesirable consequences.

Safety as an End in Itself. Although a positive approach toward safety is taken, the program seems to function in a negative way regarding fire-suppression. Treating safety as separate from the job implies a conflict between safety and effective fire-fighting. On the fire, it seems to have resulted in an emphasis on escape - on pulling out - on withdrawal from attack on the fire.

Whether or not the safety program has encouraged fear of fire rather than respect for it is hard for an outsider to determine. The emphasis on pulling out can have serious consequences. Several instances were cited in which men left the fire's edge and retreated to a "safety zone" much more hazardous than where they had been. (Incidentally, training in what is a safe area seems badly needed, and such training cannot be done adequately in the classroom.) The old adage about "one foot in the burn", which makes sense to an outsider, seems to be de-emphasized. Increasing use of dozer lines gives lower-level personnel less experience at the fire's edge, increasing the natural tendency to retreat into the unburned area. Whether the present emphasis has encouraged near indirect attack instead of direct attack which generally is intrinsically safer, would bear examination.

The ten standard orders are also separated from action on the fire. Although one cannot argue with the logic of the orders -- certainly all ten should be followed -- the fact that they are so often not followed would seem to suggest that a new approach is needed. Failure to comply with these orders seems to be primarily a result of the organizational atmosphere described earlier. And evidence suggests that the present safety program may contribute to, rather than help alleviate, the unfavorable organizational atmosphere.

The Fire Safety Officer. It appears that the way safety officers sometimes function on fires is an example of the effect of separating safety from fire suppression. In contrast to the Title 5100 job description, cases of safety officers ordering men out of attack are either quite frequent or were remembered vividly by the men interviewed. Even if the safety officer only recommends, men feel they must go by the recommendation or be "crucified" if a man should get burned. Fire safety officers are often not well qualified as safety men, with little previous experience or training in safety work. More important, the safety officer is not as well qualified as a fire man as the men in the line organization who are directing the planned attack. Since the safety officer may feel it is his personal responsibility if a man gets burned, he is necessarily very conservative. If with his limited knowledge he is not sure an action is safe, he recommends pulling out. A boss does not lightly reject such a recommendation even if he is certain it is safe because of the strong emphasis on safety of his superiors. It is felt that the safety program is a "sacred cow" which cannot be criticized.

I observed a situation one morning in which men on the fire were told the planned attack was cancelled by order of the safety officer. All day men and equipment waited, and no attack was made on the fire until evening. The point is not that the original plan was not carried out -- it may have really been unsafe. The point is that no reformulation of plans was executed in spite of safe fire-suppression actions which could have been carried out.

Safety as an Excuse. Even if line officers make decisions without the presence of the safety officer, safety often provides an easy excuse for lack of aggressive attack on the fire. At any level of the organization safety may be used as an excuse for the fire getting away. It's hard for his superior to say, "That was safe", especially when the pressure for safety, from Washington down, is on the man's side.

The Fire Behavior Officer. Like the safety program, the job of the fire behavior officer seems to be out of perspective. Except for the surprising clause "to insure that men are following planned strategy", the Title 5100 job description implies a specialized safety officer, for the particular hazard of men getting caught by fire. Apparently the actual function of the fire behavior officer varies considerably from fire to fire, often with a major portion of his time spent on duties not included in the job description.

If the man were to function as the job description indicates, he would have a negative affect similar to that described above for the fire safety officer. It may be that safety has provided a way to get acceptance of a fire behavior specialist on the fire. Even so, the appropriate objective would now be to make the most effective use of the specialist for effective fire-suppression action. His special skills can aid in planning alternative actions for all contingencies of fire behavior, so that one plan proving hazardous will not immobilize the organization. In addition, his efforts during the active period of the fire can be directed to watching for blow-up possibilities, leaving the responsibility for safety clearly where it properly belongs, with the line organization.

Also, it would be desirable for the fire behavior officer to be responsible for recording fire behavior information for future use. In addition to its usefulness for training, such information is badly needed to advance the "science" of fire behavior.

Integration of Safety with Fire Fighting. Instead of implicit emphasis on conflict between safety and effective fire-suppression action, there is need for emphasis on the positive relation between the two. If there ever was a time when safety was sacrificed in the interest of aggressive fire fighting, it seems to no longer be the case. It appears that safety is jeopardized far more by a lack of sufficient aggressive action. Good fire fighting includes effective leadership, proper burning out, consideration for the welfare of men, and the ten standard orders as an integral part of effective fire-suppression action. There is need to emphasize that men are in the long run generally safer working aggressively at the fire's edge than in backing away cautiously. Also, some type of aggressive action should be expected in almost all cases, and safety should not generally be an excuse for lack of aggressive action. Emphasis should be on proper fire fighting for its own sake, with safety included as an important integral part.

RECOMMENDATIONS

To make positive recommendations on the basis of such a brief study would be presumptuous. The following should be considered suggestions worthy of investigation, which might result in recommendations for action.

The aim of the suggestions is to improve the effectiveness of fire-suppression action on project fires, with safety included as an integral part of the operation. The aim should be particularly at effectiveness on the first day after failure of initial attack forces.

Personnel

The quality of professional-level personnel seems very satisfactory, although some lack interest in fire suppression work. Although the relevance to safety is limited, selection of sub-professional personnel might be improved by more uniformly careful attention. Improvements through the use of special tests and biographical information validated against both performance and tenure may be possible. Improvements in the working conditions and job satisfaction of sub-professional personnel seem needed. Use of questionnaire surveys such as was conducted in one forest would provide more objective information for the evaluation of proposed changes.

Organizational Atmosphere

General attention should be given to means for the improvement of the "organizational atmosphere." An expectation of aggressive fire-suppression action throughout the organization should be developed, and attention given to means for improvement of organizational function on the first day after the fire escapes initial attack. Improvement of procedures for elimination, detection, and repairing of "snafus" should be sought, and integrated with anti-snafu training.

Recognition of the need for improvement of communication upwards is indicated, and overlap of overhead when changing shifts is felt to be highly desirable. Recognition is also needed of the harmful effects of fatigue in the present system, and means such as special hours and special resting arrangements for overhead might be considered. Possibilities of combining fatigue reduction with motivation for aggressive action might be considered, such as changing a major portion of the overhead at 10 A.M. whether the fire is controlled or not. Policies regarding assignment of personnel should be evaluated with respect to their effect on the organizational climate. The possibility of developing overhead teams to take over fires as a unit may be worth investigating. At any rate, attention to balancing needs for different types of overhead with existing numbers of qualified men should be integrated with the training program.

Means for rewarding superior fire-suppression performance by personnel not full-time in fire control should be sought. (The new "red cards" are a step in the right direction). Means for increasing the status of fire-suppression work should be explored.

When the job analysis recommended below has been completed and evaluated, it is suggested that the structure and function of the organization as a whole be evaluated, aiming at a fully-rationalized organizational system as opposed to an overgrown small-fire organization.

Training

The most fruitful approach for improvement of fire safety and fire suppression seems to be in development of a new training program. It should include the following elements:

1. Modern leadership training. The present "fad" of leadership training in industry, often under the name "executive development", seems to have immediate application. Although a "canned" program could do little good if not adequately tied in to fire control, a well-conducted program could do a great deal toward improving the present "organizational atmosphere".

Instead of the emphasis on orders downward, emphasis in such training is on helping each man to develop a plan of action for his area of responsibility within the overall plan at the next higher level. ^{his} The stake that the man has in his own plan motivates him to make it work effectively, and his superior delegates him sufficient authority so that he can carry it out. Through a close personal relationship with sensitivity to the needs of each other, mutual understanding and effective communication take place. Instead of the emphasis on issuing sound orders, the emphasis is on the human relations aspects of supervision.

For such a program to be successful it must start from the top down. A man will not be able to put the training into practice if his superior does not do so ^{as} well. Classroom training only will have relatively little effect. It should be thoroughly integrated with the job, and procedures devised for following up on the ground.

2. Training on the Fire. The presently-wasted potential for on-the-fire training should be used effectively, for jobs from top to bottom of the fire organization. Integration of preseason and on-the-job training and of theory and practice, plus the experience of learning from a man with greater experience, could greatly increase the learning rate.

By taking account of training considerations in the assignment of men, particularly early and late in the season or when the fire load is light, and possibly overstaffing at such times for training reasons, a planned quota of trained overhead for the various positions could be developed. Use of coaches for the fire boss and for specialists might be considered. Although development of simulated training situations may be fruitful, particularly for anti-snafu training, it would seem to be secondary to development of on-the-fire training.

An important part of every overhead job must be the training of subordinates. Men must be taught to be effective trainers and to make their knowledge explicit. Instead of issuing orders, the superior must learn to communicate the task to be completed with sufficient overall information for it to be understood. He must learn to let the subordinate formulate his own plan, which the superior will go over with him, helping him to improve it and making sure that it is sound and will permit neither snafus nor unsafe situations to arise. When the subordinate gets into trouble, his superior must learn to help him work it out himself rather than usurping the subordinate's authority.

Fortunately the leadership training suggested above and on-the-job training go together very well. The effective leader and the effective trainer have a good deal in common. A close personal relationship, delegation of authority, and emphasis on development of the subordinate are necessary for both.

3. Job Analysis. In order for effective preseason and on-the-fire training to be developed, it would be necessary to first determine what should be taught. Although for many lower-level jobs adequate training requirements are already worked out, the functions of overhead and of specialists are not fully worked out and are not obvious. Existing job descriptions are not an adequate analysis of the job, since in most cases they merely define the area of responsibility and a few important details not to be neglected.

Job analysis in addition to defining such things as area of responsibility, relation to other jobs, and job conditions, is a procedure for finding out what the man does, how, and why. If one observes a sector boss, one finds he spends most of his time observing, thinking, and talking. By observing an effective sector boss in action, and by asking him questions, it is possible to make explicit, to a limited but worthwhile degree, what it is that he observes, what are the nature of his thought processes, and whom he talks to and what he says to them and finds out from them. Observation of some poor and mediocre sector bosses, as well, would aid in determining what it is that differentiates the good from the mediocre and poor. Although some very good overhead are not gifted at making their thought processes explicit, they may be excellent critics of such thinking made explicit by others. Although training materials based upon such job analyses (perhaps including some case studies) would not in themselves teach a man to be a good sector boss, they would provide a structure to aid the superior in carrying out on-the-fire training. Attention might also be given to fatigue to obtain information regarding the number of hours certain types of work could be performed effectively. Job analyses also usually find, as an important by-product, ways in which the job can be improved. Such information would also be useful for examining the function of the organizational structure.

4. Fire-Behavior Training. The preoccupation of fire-behavior training with safety should be removed, and fire behavior integrated with effective fire-suppression action. Effective fire-behavior training on the fire, tying in theory with practice, is of great importance. Integration of pre-season and on-the-fire training would probably result in improvement in pre-season training as well.

Safety Program

It is recommended that the present emphasis on safety be changed to eliminate its emphasis on safety as an end in itself. Instead, emphasis should be on integrating provisions for safety with aggressive fire-suppression action. If fire-behavior forces abandonment of the original plan for safety reasons, alternative aggressive action which is safe should be expected in most cases.

The responsibility for fire safety should rest solely with the line organization, and provision made for its adequate supervision there. The fire safety officer should function as his Title 5100 job description indicates, without principal responsibilities for fire safety. The "safety watchdog" aspects of the fire-behavior officer's function should be removed, and his function as a fire-behavior specialist strengthened. Operating within the plans group, devoting full time to predicting probable and possible behavior of the fire, his efforts can be helpful rather than restrictive to the line organization. Working closely with the plans group, he can assist in making plans for the most probable fire behavior which include plans for other possible fire behavior, so that the line organization can proceed safely and aggressively with the fire fighting job.

AD-33 Bookplate
(1-63)

U. S. FOREST SERVICE

NATIONAL

EL COLLINS

**A
G
R
I
C
U
L
T
U
R
A
L**



LIBRARY

LIBRARY COPY
ROCKY MT. FOREST & RANGE
EXPERIMENT STATION